

# Chunhua Liu

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## RESEARCH INTERESTS

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My research interests center around understanding the structure and relationships between concepts through interdisciplinary perspectives, including natural language processing and cognitive psychology. With a specific emphasis on:

- understanding the structure and reasons behind human word associations
- evaluating the potential of word associations as a source of commonsense knowledge
- incorporating commonsense knowledge to improve neural models' reasoning ability on tasks, such as commonsense question answering and natural language inferences
- exploring concept representation and categorization across languages and cultures

## EDUCATION

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**Ph.D., The University of Melbourne, Australia** 2019 -

“Word Associations as Commonsense Knowledge Acquisition”

Supervisors: Prof. Trevor Cohn and Dr. Lea Frermann

**M.Sc. in Computer Application Technology, China** 2016 - 2019

**Beijing Language and Culture University** (GPA: 90.2/100)

“Natural Language Understanding with Matching Network”

Supervisor: Assoc. Prof. Dong Yu

**B.Sc. in Computer Science and Technology, China** 2012 - 2016

**Beijing Language and Culture University** (GPA: 85.3/100)

“Character Relationship Mining”

Supervisor: Assoc. Prof. Dong Yu

## SELECTED PROJECTS

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**WAX: A New Dataset for Word Association eXplanations** [1] 2021 - 2022

- Why do people associate certain words with others (e.g., bagpipe and kilt)? Existing research focuses mainly on capturing associations between words, but not on the underlying reasons.
- To address this gap, we present a large-scale dataset **WAX**, which provides human-generated explanations for word associations to deepen understanding of reasons and relationship structures in human associations.
- Utilizing the WAX dataset, we evaluate pre-trained language models on their ability to classify relations and generate explanations. Our findings show that WAX explanations significantly strengthen models' capacity for classifying ambiguous pairs and generating diverse explanations.

## Commonsense Knowledge in Word Associations [2]

2020 - 2021

- The acquisition of large-scale commonsense knowledge to support machine commonsense reasoning is a persistent challenge in natural language processing, requiring innovative methods for obtaining scalable and efficient sources.
- We propose that the technique of “free word association” from Cognitive Psychology can serve as a valuable solution. This approach allows humans to articulate diverse and comprehensive commonsense knowledge through their mental associations.
- Our comparison of the large-scale word association network (SWOW) and the largest commonsense knowledge graph (ConceptNet) reveals complementary knowledge with comparable improvement in commonsense question-answering tasks, making SWOW a valuable new source of commonsense knowledge.

## Matching Network for Natural Language Inference [3]

Sep 2017 - Feb 2018

- Natural language inference aims to determine the logical relationship (entailment, contradiction, or neutral) between a premise and a hypothesis sentence. However, existing neural models ignore the interactions among different features when comparing the similarities and differences between the premise and hypothesis.
- To address this issue, we propose Multi-turn Inference Matching Network (MIMN) which utilizes a memory component to store matching features and a multi-turn inference mechanism to facilitate interactions between the features.
- The model is shown to be effective on three NLI datasets: SNLI, MPE, and SCITAIL, achieving up to 8.9% improvement in accuracy compared to existing models.

## TEACHING

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### Tutor “Introduction to Machine Learning”

2021, 2022

1st year M.Sc course, Sch. of Computing and Information System, UniMelb

### Tutor “Natural Language Processing”

2022

2nd year M.Sc course, Sch. of Computing and Information System, UniMelb

### Project Supervisor of Data Science Project

2021

2nd year of M.Ds course, Sch. of Computing and Information System, UniMelb

### Tutor “Dynamic Programming (Perl)”

2017

3rd year of B.Sc course, Sch. of Information and Science, BLCU

## MISC

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**Language:** Mandarin, English

**Programming Skills:** Tensorflow, PyTorch, Python, Perl, C++, C, Shell, L<sup>A</sup>T<sub>E</sub>X, R

**Web Languages:** HTML5, CSS3, JavaScript

**Version Control:** Github, Gitlab

**Hobbies:** Table Tennis, Running, Cycling, Tennis, Swimming

## AWARDS AND ADDITIONAL CERTIFICATES

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PhD. Scholarship Fund, China Scholarship Council	2019-2023
Outstanding Paper Award, NLPCC	2018
National Scholarship (Top 5% at school)	2018
1st Prize Scholarship	2018
3rd Prize Scholarship	2017
National Encouragement Scholarship	2014, 2015
Excellent Student Cadre	2015
Merit Student	2014
2nd Rank, CLP2014 Shared Task	2014
2rd Prize Scholarship	2013

## SELECTED PUBLICATIONS

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- [1] **Chunhua Liu**, Trevor Cohn, and Lea Frermann. “Commonsense Knowledge in Word Associations and ConceptNet”. In: *Proceedings of the 25th Conference on Computational Natural Language Learning*. Online: Association for Computational Linguistics, Nov. 2021, pp. 481–495.
- [2] **Chunhua Liu**, Trevor Cohn, Simon De Deyne, and Lea Frermann. “WAX: A New Dataset for Word Association eXplanations”. In: *Proceedings of the 2nd Conference of the Asia-Pacific Chapter of the Association for Computational Linguistics and the 12th International Joint Conference on Natural Language Processing (Volume 1: Long Papers)*. Online only: Association for Computational Linguistics, Nov. 2022, pp. 106–120.
- [3] **Chunhua Liu**, Shan Jiang, Hainan Yu, and Dong Yu. “Multi-turn Inference Matching Network for Natural Language Inference **Outstanding Paper Award**”. In: *Natural Language Processing and Chinese Computing (NLPCC)* (2018).
- [4] **Chunhua Liu**, Yan Zhao, Qingyi Si, and Dong Yu. “Multi-Perspective Fusion Network for Commonsense Reading Comprehension”. In: *Chinese Computational Linguistics and Natural Language Processing Based on Naturally Annotated Big Data*. Cham: Springer International Publishing, 2018, pp. 262–274.
- [5] **Chunhua Liu**, Haiou Zhang, Shan Jiang, and Dong Yu. “DEMN: Distilled-Exposition Enhanced Matching Network for Story Comprehension”. In: *Paclic* (2018).
- [6] Meiqian Zhao, **Chunhua Liu**, Lu Liu, Yan Zhao, and Dong Yu. “BLCU\_NLP at SemEval-2018 Task 12: An Ensemble Model for Argument Reasoning Based on Hierarchical Attention”. In: *NAACL-HLT 2018 Joint workshop on semantic evaluation (SemEval)*. 2018.
- [7] Yukun Feng, Dong Yu, Jian Xu, and **Chunhua Liu**. “Semantic Frame Labeling with Target-based Neural Model”. In: *\*SEM 2017*. 2017, pp. 91–96.

- [8] Dong Yu, **Chunhua Liu**, and Yue Tian. “Personal title and career attributes extraction based on distant supervision and pattern matching (*In Chinese*)”. In: *Journal of Computer Application* 36.2 (2016), pp. 455–459.
- [9] Dong Yu, Cheng Yu, Qin Qu, Gongbo Tang, **Chunhua Liu**, Yue Tian, and Jing Yi. “An Introduction to BLCU Personal Attributes Extraction System”. In: *Proceedings of The Third CIPS-SIGHAN Joint Conference on Chinese Language Processing*. Wuhan, China: Association for Computational Linguistics, Oct. 2014, pp. 120–125.
- [10] Shan Jiang, Bohan Li, **Chunhua Liu**, and Dong Yu. “Knowledge Augmented Inference Network for Natural Language Inference”. In: *Knowledge Graph and Semantic Computing. Knowledge Computing and Language Understanding*. Ed. by Jun Zhao, Frank van Harmelen, Jie Tang, Xianpei Han, Quan Wang, and Xianrong Li. Singapore: Springer Singapore, 2019, pp. 129–135.
- [11] Yan Zhao, Lu Liu, **Chunhua Liu**, Ruoyao Yang, and Dong Yu. “From Plots to Endings: A Reinforced Pointer Generator for Story Ending Generation”. In: *Natural Language Processing and Chinese Computing*. Ed. by Min Zhang, Vincent Ng, Dongyan Zhao, Sujian Li, and Hongying Zan. Cham: Springer International Publishing, 2018, pp. 51–63.